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AN OXYRHYNCHUS FRAGMENT ON HARMONIC THEORY

The tattered remains of a few paragraphs of a work on harmonic theory were published in 1986 as *P. Oxy.* LIII.3706, with a careful commentary by M. W. Haslam.¹ There are six fragments. Four of them (frr. 3–6) are too small for any substantial sense to be recovered; and while fr. 2 and the second column of fr. 1 allow us to pick out significant words and phrases here and there, the remnants of these columns are very narrow, and the line of reasoning seems inaccessible. Musicological analysis must focus on the first column of fr. 1. There is little enough even of that, and in attempting a relatively detailed interpretation I shall have to be rather less cautious than Haslam quite properly was. But I think that something can be made of it without stretching speculation too far, and if I am right the piece is of some genuine interest. Here are the two versions of the text that Haslam prints. The first records what is decipherable on the papyrus itself, while the second represents a partial reconstruction, restoring word-divisions and some of the missing letters.

	]κυα[ ]		]κυα
	]τολν[ ]		]τολν[]
	]ελελιζο		]ελελιζο-
	]εκδια		]εκ δια-
5	]...κτημελο	5	μ]εικτή μελο-
	]τ[...οιρν...ριτσειδης.		]τ[...οιρν...τριτσειδης.
	]μειξ'ιουκ'μαλισταυτς		]μειξειου κ(αι) μάλιστ' αὐτ(αῖ)ς
	]αιτοηθοςμελωδειταιγ'		]αι τὸ ἦθος· μελωδεῖται γ(άρ)
	]διατονουπαρα...[ ]		] διατόνου παρανήτῃ[ε]
10	]εχ[ῆ]ςδτουθαπαν	10	συν]εχές δ(ἐ) τοῦθ' ἅπαν
	]ριτηστη[...οξυτερα. [ ]		]ριτης τῇ[...ὀξύτερα.
	]...ονδιαβα...ει. [ ]		]...ον διαβαίνει. []
	]ωκ'έναρμον[ ]		]ω κ(αι) έναρμον[ίω
	]λλαδδειτουτ[ ]		]λλα δεῖ τουτ[]
15	]λονμ[...]. []	15	]λον μ[...]. []
	]τοτ[ ]		]τοτ[]
	]μ...[ ]		]μ(εν)οι[]

In the bulk of this paper I shall be offering as full an interpretation as I can of the argument that this passage seems to have contained. At the end I shall turn very briefly to wider issues, attempting to draw some inferences about the character of the work from which it came, and to decide whether its contents add anything to our knowledge of Greek harmonics or are merely repetitions of familiar doctrine. I shall resist the temptation to speculate about its authorship. As will become clear, Haslam was certainly right to locate it in the Aristoxenian tradition; but so far as I can tell it might have been written at any time between the fourth century B.C. and the date of the papyrus itself (second or third century A.D.).

The task of analysis will be easier if we can find some way of identifying the topic under discussion reasonably precisely in advance, before attempting to reconstruct the details of the passage as a whole. The more sharply the subject matter can be pinpointed at this stage, the easier it will be to work out how the argument runs, and to guess at the contents of lacunae. (Any such prior identification of a subject must of

¹ *The Oxyrhynchus Papyri*, vol. LIII (1986), ed. M. W. Haslam, pp. 49–55.

course be hypothetical, inviting support, modification or explosion when the minutiae begin to be filled in.) Haslam was probably correct, I think, in locating the general area of discussion by reference to the concept of *mixis*.² In line 5, *μεικτὴ μελοποιία* seems almost certain.³ In line 7 we have the slightly confusing group of letters *μειξίου* or *μειξίου*, in which the same word-stem is surely involved: I cannot bring myself to believe in the hypothetical music-theorist Meixias conjured up in Haslam's note on this line (p. 53: I cannot in fact see how to accommodate a reference to any named individual at this point in the text). The word *μικτή* appears in fr. 2.12, and though the papyrus remnants provide little intelligible context for it we can be confident that musical technicalities are still in play, in view of the indubitable reference to a tetrachord or tetrachords in the next line (the surviving letters are *τετραχ*).

Allusions to 'mixture' appear in musicological writings in the same context as references to 'modulation' (*μεταβολή*), that is, where an author is contemplating a continuous sequence of notes not all of which belong to the same system (very roughly, the same 'scale'), as such things are conceived by harmonic theorists.⁴ Such a sequence is said to be a 'mixture' of elements from several systems, or to 'modulate' between them, to shift (*μεταβάλλεσθαι*) from one to another. If the word *μελοποιία* is right in line 5, the author is thinking of techniques whereby a composer mingles elements from several scalar systems in a single melody. It should be noted that mixtures and modulations were not merely products of the theorists' imaginations: there are plenty of examples in surviving scores.⁵

But this way of identifying the subject is too broad to be satisfactory. Greek writers classified scale-structures according to several different criteria, and could therefore envisage modulations or mixtures of several sorts. (Rather similarly, the musicology of the modern 'classical' tradition classifies according to key and according to mode, and can distinguish modulations of key, as from C major to G major, from modulations of mode, as from C major to C minor.) We hear of modulations of *γένος*, of *τόνος* (in at least two senses), of *σύστημα*, and so on;⁶ and it would be an advantage if we knew which of them was under examination here.

Though he concedes that the sense of 'mixed *melopoiia*' must remain uncertain here, Haslam is confident that one of the topics under discussion is change of genus.⁷

² See his prefatory comments (p. 49) and note on line 5 (p. 52).

³ Haslam's statements in his note on this line (p. 52) that *μελοποι-* is 'very probable' and that *μεικτὴ μελοποιία* 'would well suit the remains' seem to me to underplay his hand. I would reckon the case almost conclusive, despite the different spelling *μικτή* in fr. 2.12.

⁴ Aristoxenus uses the terms *μίξις*, *μικτός*, etc. in this kind of context at *El. Harm.* 7.3, 7.6, 17.26, 44.26; compare e.g. Cleonides, *Eisagoge* 6 (189.11, 15 Jan), Ptol. *Harm.* I.16 (especially 38.33–39.14, 40.8–10 Düring), II.6 (56.1–4). In these Ptolemaic passages references to *μίξις* and to *μεταβολή* are regularly linked. For other discussions of *μεταβολή* in these authors see Aristox. *El. Harm.* 7.10–8.3, 38.6–17, cf. 34.8–11, 40.12–24, Cleonides, *Eisagoge* 11 and 13, Ptol. *Harm.* II.6–11, and see also especially Aristides Quintilianus, *De mus.* 22.11–26 with context.

⁵ For a convenient summary see M. L. West, *Ancient Greek Music* (Oxford, 1992), pp. 195–6. More detail is offered in his notes on individual compositions (ch. 10): for fuller discussion see E. Pöhlmann, *Denkmäler Altgriechischer Musik* (Nürnberg, 1970). The brief remarks introducing each composition in J. Chailley, *La musique grecque antique* (Paris, 1979), ch. 8 are especially helpful for present purposes, since the presence or absence of modulation is a feature to which the author regularly draws attention.

⁶ For lists and brief characterisations see Cleonides, *Eisagoge* 13, Bacchius, *Eisagoge* 50–8, Anon. Bell. II.27, III.65.

⁷ In his note to line 5, p. 52. According to the Greek theorists, the basis of all musical systems (scales) is the division of each octave into two stretches each spanning a perfect fourth, together with the interval of a tone (in the paradigmatic form of the octave this is placed between the two fourths), thus: E–A, B–E'. Each of the fourths is then subdivided by the insertion of two further notes, which with the notes bounding the fourth constitute a 'tetrachord'. While the positions

I think he is probably mistaken. Genera are indeed mentioned (diatonic in line 9 and perhaps in line 4, enharmonic and probably chromatic in line 13), while there are no traces of the names of *tonoi* or *harmoniai*, and no indication that words such as *τόνος*, *ἁρμονία*, *εἶδος*, *σύστημα* and so on figured anywhere in this discussion. Nevertheless, the run of the text seems to undermine the natural inference that the focus of the passage is on mixtures of genera. After some prefatory remarks, I suggest, it contained first a proposition about mixed *melopoiia*, perhaps in two sentences (lines 3–5, 6–8), and secondly an explanation of the proposition (*μελωδεῖται γὰρ...*), probably continuing as far as *διαβαίνει* in line 12. So far we are in territory where there are, apparently, references to the diatonic genus only. Enharmonic and (probably) chromatic appear in the next line,⁸ but in a setting that strongly suggests a contrast rather than an association with what is said of the diatonic in the preceding lines; for if *ἀλλὰ δεῖ* is correct in line 14, the most probable thread of sense from the gap after *διαβαίνει* in line 12 down to this point is surely: ‘but this (the contents of lines 3–8) is not the case in chromatic and enharmonic: rather, one must (*ἀλλὰ δεῖ...*)...’.

In that case we need to identify a kind of *mixis* of which some significant proposition is true when diatonic sequences are under consideration, but not otherwise; and mixtures of genera cannot be involved. It should be a proposition that the present stretch of text can plausibly be supposed to have expressed and explicated. Our analysis should also take into account another point correctly noted by Haslam (initially on p. 49), but from which he drew no conclusions. When Aristoxenus discusses differences of genus by reference to the inner, ‘moveable’ notes of a tetrachord, he takes as his example the tetrachord *mesōn* (which approaches *mesē* from below, its notes being *hypatē*, *parhypatē*, *lichanos*, *mesē*).⁹ All later writers follow him. But the notes named or alluded to by the present writer do not belong to this tetrachord: notes called *tritē* and *paranētē* are found only in tetrachords that lie in the upper part of the system, above *mesē*. In theory, as Haslam says, this need make no difference, since every tetrachord in any one (theoretical) system had exactly the same internal structure: a tetrachord whose form is determined by the positions of *tritē* and *paranētē* could be used as a paradigm in this context just as appropriately as one involving *parhypatē* and *lichanos*. Nevertheless, the habit of focussing on the tetrachord *mesōn* in this context seems so well entrenched among writers on harmonics that it is scarcely convincing to dismiss the Oxyrhynchus author’s usage as merely incidental. If he concentrated on the tetrachords above *mesē*, it is likely that he had good theoretical reasons for doing so.

of the notes bounding the tetrachord are fixed relative to one another and to other notes in the initial framework, those of the notes inside each tetrachord are not. The three ‘genera’ and their subspecies are distinguished from one another by the positions of the two inner notes of the tetrachord, especially the higher of them, in relation to the tetrachord’s boundaries. Very roughly speaking, if the higher moveable note is placed very low in the tetrachord, the genus is enharmonic: if it is placed at or above the mid-point in this span the genus is diatonic: between these extremes the genus is chromatic.

⁸ The reference to chromatic is inferred rather than observed, but is really in little doubt. Haslam’s note to line 13 (p. 54) presupposes that where we have a phrase of the form ‘x and enharmonic’, ‘x’ must be either ‘chromatic’ or ‘diatonic’. At first blush this seems a pretty sweeping assumption. I have not run a detailed check on it. In fact, however, I would be astonished if it turned out to be wrong in more than a tiny minority of cases.

⁹ *El. Harm.* 21.31–22.21 (cf. 46.19–24). Aristoxenus explains that his choice of this tetrachord to exemplify the changes by which shifts of genus are produced is only a matter of convenience: of the various groups of notes that could have been chosen by way of example, this one happens to be *σχεδὸν γνωριμωτάτη τοῖς ἀπτομένοις μουσικῇς*.

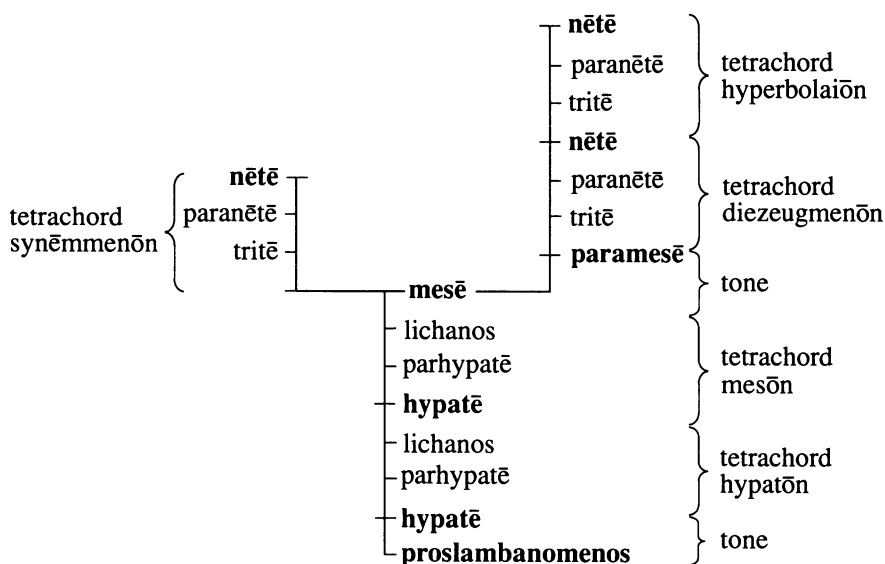


Fig. 1.

The general direction in which these considerations point is unmistakable. When the complete system of notes is set out in its standard form, it follows a linear series through the first octave from *proslambanomenos* up to *mesē*, the octave being constituted by the interval of a tone at the bottom followed by two tetrachords in conjunction.¹⁰ Above *mesē*, however, the series is conceived as having alternative continuations. It may proceed either to a further tetrachord in conjunction with the tetrachord *mesōn*, known as the tetrachord *synēmmenōn*, or to a tetrachord disjoined from *mesōn* by the interval of a tone, the tetrachord *diezeugmenōn*. (Above this and in conjunction with it lies a further tetrachord, *hyperbolaiōn*, completing the double octave; but this need not concern us here.) In the diatonic genus as most commonly conceived, each tetrachord rises through the series of intervals semitone, tone, tone, as in the sequence from E to A on a modern keyboard. Thus if EFGA corresponds to the tetrachord *mesōn*, with *mesē* on A, the alternative continuations upwards are (A)B^bCD (*synēmmenōn*) and BCDE (*diezeugmenōn*). The Greek names for the second, third and fourth notes in each of these tetrachords are *tritē*, *paranētē* and *nētē*: when distinctions need to be made, the word *synēmmenōn* or *diezeugmenōn* is added to the name. The diagram above (Fig. 1) may help to clarify the arrangement.

A form of modulation that seems to have been very familiar, and to which several writers give a special name of its own, modulation 'of *systema*', is that in which progressions through notes in both of these tetrachords are combined in a single sequence. Cleonides, for example, defines it as occurring 'when a modulation is made from conjunction to disjunction or the reverse' (*Eisagoge* 13, 205.5–6 Jan): he has

¹⁰ Tetrachords are said to be in conjunction (*συνημμένα, κατὰ συναφήν*) when they are so linked in a series that the top note of one tetrachord serves also as the bottom note of the next. They are in disjunction (*διεzeugμένα, κατὰ διάzeugξιν*) when they are separated by an interval that stands outside either tetrachord, and this interval is always a tone. (Thus the series of white notes on a keyboard from B up to A constitutes a pair of tetrachords in conjunction, sharing the note E, while the series from E to E' is a pair of tetrachords in disjunction, E–A and B–E, separated by the tone A–B.) See especially Aristox. *El. Harm.* 58.14–60.9.

discussed the ‘conjunct’ and ‘disjunct’ forms of system a little earlier (*Eisagoge* 10–11). Similar definitions appear in Aristides Quintilianus (*De musica* 29.12–14 Winnington-Ingram)¹¹ and perhaps in Bacchius (*Eisagoge* 51, 304.10–12 Jan), though here the text needs a minor emendation to secure an equivalent sense.¹² The phenomenon is also discussed at length by Ptolemy (*Harm.* II.6, 53.28–57.9 Düring): his purpose is to demonstrate that the tetrachord *synēmmenōn* need not be construed as belonging to a genuinely distinct system, but can be reached within the framework of the ‘disjunct’ system through a modulation of a different sort, familiar in other contexts. The sort of modulation we are discussing, he argues, need not be treated as a special case, involving a peculiar theoretical apparatus of its own.

It is precisely this sort of modulation, I suggest, that is being considered in the papyrus fragment.¹³ I shall attempt to clarify and substantiate the hypothesis through a more or less continuous reconstruction of the text, with comments along the way.

Line 5 apparently referred to *μεικτῇ μελοποιίᾳ*, ‘mixed melodic composition’. It is clear from the sequel that the author has some particular nexus of notes in mind: let us provisionally assume that the missing portions of lines 4–5 contained a reference to the note *paranētē*. (There is some slight evidence for this. In line 4 we have the remnant *ἐκ δια-*, and when the prefix *δια-* reappears in line 9 it is in the phrase *διατόνου παρανήτης*. Perhaps the same phrase occurred earlier too.) We might then reconstruct line 6 and the beginning of 7 roughly as follows: *ἐστι δὲ* (or *γίνεται δ’*) *οἰονεῖ τριτοειδῆς ἐν τῇ μείξει*, ‘but it is (or ‘becomes’) as it were of the nature of a *tritē* in the mixture’.¹⁴ That is, the note which is diatonic *paranētē* in the context of the tetrachord *synēmmenōn* becomes ‘as it were’ a *tritē* when mixed into a sequence with notes belonging to the tetrachord *diezeugmenōn*. As Nicomachus, for example, points out, in the most familiar form of the diatonic genus *paranētē diezeugmenōn* and *nētē synēmmenōn* have the same pitch (*Enchiridion* 11, 259.11–13 Jan), and the same is true of *paranētē synēmmenōn* and *tritē diezeugmenōn*.

The sequel in lines 7–8 reads *οὐ καὶ μάλιστ’ αὐταῖς / ... -αι τὸ ᾗθος*. Haslam plausibly suggests *μεταβάλλεται* at the beginning of line 8: *συμμεταβάλλεται*, if it would fit the space, might be even better. Reading the first two letters as *οὐ*, and placing a comma before them, we get something that might have the sense ‘whose character is most especially altered by them’ (or ‘along with them’); or with a different verb, *συνάπτεται* for example, the gist might be ‘whose character is particularly closely tied to them’.¹⁵ But the reference of ‘them’, *αὐταῖς*, is unclear. One might try to take it as referring to the adjacent notes, explaining the gender by

¹¹ Here the subject is broached initially in a discussion of forms of melodic progression, rather than merely of scale structure, and what is defined is *ἀγωγή περιφερής*, ‘circular progression’: it is said to proceed upwards through notes in conjunction, downwards through notes in disjunction. But Aristides adds that the topic is one that is also studied in the context of modulation.

¹² The emendation is small but crucial, involving the insertion of a negative. See L. Zanoncelli, *La manualistica musicale greca* (Milan, 1990), p. 295 n. 37.

¹³ Haslam hints at some of the points on which this interpretation is based at the end of his note on line 6 (pp. 52–3), but seems not to think them worth pursuing.

¹⁴ The word *τριτοειδής* is not met elsewhere, but its formation is parallel to terms such as *λιχανοειδής*, *ὕπατοειδής*, and so on, which are quite common in harmonic texts. Close analogues for the usage we seem to have here are at e.g. Aristides Quintilianus, *De mus.* 9.21, 25, 26. The sense of such terms can vary with context: thus e.g. Aristides’ use of *ὕπατοειδής* and *μεσοειδής* at 81.21–3 is substantially different, as is that of Anon. Bell. at III.63–4.

¹⁵ There are a good many other possibilities. An author with Platonist leanings, like Aristides Quintilianus for instance, might have written *ὁμοιοῦται* or one of its compounds: cf. e.g. *De mus.* 76.21, 79.25.

reference to the fact that their names are feminine (they are in origin adjectives, the noun *χορδή* being understood). But the usage would be most unusual, and becomes quite impossible if οὐ also refers to a note (*φθόγγος*), the one that has become *τριτοειδής*. Of the various other possibilities that suggest themselves, the best, I think, is to take the copyist's confusion at the beginning of line 7 as concealing *ταῖς μείξεσι*, rather than *τῇ μείξει*: then *αὐταῖς* is 'the mixtures', and there is nothing mysterious in the assertion that the character of a note is changed by them or along with them, or is assimilated to them. The *καὶ* in *καὶ μάλιστα* may be merely intensitive, but the sense 'also' is perfectly possible: the *ἦθος* of the note, as well as its name and its locus in the tetrachord, is dependent on the 'mixture' in which it is embedded.¹⁶

With *μελωδεῖται γὰρ* in line 8 the author apparently proceeds to an explanation of what he has so far said. I suggest a continuation of the following sort, down to line 12. *μελωδεῖται γὰρ / τὸ τῆς διατόνου παρανήτης, / συνεχὲς δὲ τοῦθ' ἅπαντα τὸν / τῆς τρίτης τῆς ὀξυτέρας / τόπον διαβαίνει.*¹⁷ On this reading, *τὸ* in line 9 and *τοῦθ'* in line 10 pick up the word *ἦθος*, which I take to overlap in sense here with the Aristoxenian term *δύναμις*, 'musical character', 'melodic function'.¹⁸ The sense will be: 'for there is sung the character (note-function) of diatonic *paranēte*, but this traverses, without discontinuity, the whole of the range of the higher *trite*'. This looks

¹⁶ References to changes in *ἦθος* might suggest that the kind of *μεταβολή* being discussed is after all not *μεταβολή κατὰ σύστημα* as Cleonides defines it, but what Cleonides calls *μεταβολή κατὰ μελοποιίαν* and defines by reference to change of *ἦθος* (*Eisag.* 13, 206.3–18), while Bacchius straightforwardly calls it *μεταβολή κατὰ ἦθος* (*Eisag.* 50 and 54): cf. also Aristides Quint. *De mus.* 30.1–17. The association of the terms *μελοποιία* and *ἦθος* in Cleonides (also in Aristides) might seem a strong pointer. But I think this is unlikely. None of the Aristoxenian sources gives any sign of believing that such 'modulation of ethos' could be given a closely technical analysis: none of the structuring concepts of harmonic theory, such as those used to characterize other forms of modulation, appear in connection with this one, which is defined only in impressionistic terms related to aesthetic response. The Oxyrhynchus author, by contrast, is plainly offering a technical analysis grounded in Aristoxenian theory. It is however worth noting the unusual definition given for *μεταβολή κατὰ ἦθος* at Anon. Bell. II.27: it occurs *ὅταν ἐν αὐτοῖς τοῖς τετραχόρδοις τὰ ἦθη τῶν φθόγγων τὴν μετὰπτωσιν λαμβάνη*. The kind of modulation envisaged is certainly different from that given the same name by Bacchius. But what does the definition mean? It cannot be alluding to those movements of notes in the tetrachord that create modulations of genus, since that sort of modulation is explicitly distinguished from *μεταβολή κατὰ ἦθος*, and has been defined in the preceding lines. Most probably, I think, *ἐν αὐτοῖς τοῖς τετραχόρδοις* is to be taken closely with *τὰ ἦθη*. What changes is a note's character in a tetrachord: that is, it acquires a different role in the tetrachord, for instance by becoming a tetrachord's bounding note when previously it was not. This is just the sort of 'change of character' that is generated by Cleonides' *μεταβολή κατὰ σύστημα* (a kind of modulation not mentioned by this name in the list given by Anon. Bell.).

¹⁷ *τόπος* is Aristoxenus' regular term for the range within which a moveable note can move. For the expression *τόπον διαβαίνειν*, though in a slightly different context, see *El. Harm.* 9.16. Haslam (p. 50) reports traces as of a *π* in the gap before *-ονδιαβ*.

¹⁸ The concept of a note's *δύναμις* is of central importance in Book II of Aristox. *El. Harm.* It is nowhere defined, but seems to be constituted by the relations in which a note stands, and may legitimately stand, to others and to the system of which it is a part. The doctrine that a note's identity lies in its *δύναμις* is contrasted with the view (stated in Book I, 15.15–16) that a note is merely 'the incidence of the voice on a single pitch': see 36.6–14. For other important occurrences of the term see 33.6–9, 33.34–34.5, 36.4–6, 40.4–24, 47.29–48.7, 49.2–7; cf. also my discussion in 'Aristoxenus' Theorems and the Foundations of Harmonic Science', *Ancient Philosophy* 4 (1984), pp. 23–64, particularly Section VII. No author uses the word *ἦθος* as a direct equivalent for the Aristoxenian *δύναμις* (though the usage at Anon. Bell. II.27, n. 16 above, seems to be close), and I do not suggest that the present author does so. We do however find the view that individual notes possess 'character', and that this is closely linked to their positions in the tetrachord and other 'dynamic' properties: the view is elaborated most fully at Aristides Quintilianus, *De mus.* 77.17–82.3.

initially like an overcomplicated way of making Nicomachus' point that diatonic *paranētē* (*synēmmenōn*) and *tritē* (*diezeugmenōn*), here quite appropriately called the 'higher' *tritē*, standardly have the same pitch. But in fact the complexities are not otiose.

The point that the writer is making can be identified with some precision in the context of Aristoxenian theory.¹⁹ To begin with, the identity of a note, as indicated by its name, is never determined solely by its pitch, but depends on its *δύναμις*; and this depends in turn on the relation in which the note stands to other notes and systems of notes in its vicinity. The note under consideration here acquires the character, *ῥῆθος* or *δύναμις*, of a *paranētē* from the sequence of notes from which it emerges, and hence it strikes the ear as a *paranētē* at the moment when it is sung (*μελωδεῖται*). But in the light of the notes that follow, its character is transformed into that of a *tritē*, a note with a quite different function in the tetrachord and different relations to its surroundings. Secondly, this is musically possible because, as our author says, notes with the character of a diatonic *paranētē* inhabit the same range of pitch as notes with the character of a *tritē*. But what exactly does this mean, and why does the author speak of a 'range' over which the two note-functions coincide, rather than merely asserting the identity of their pitches? The point requires some careful unravelling. According to Aristoxenus, the moveable notes within the tetrachord do not have fixed locations with respect to the tetrachord's boundaries, even when they are restricted to a single genus. They have a small but determinate range of variation, and they may be placed anywhere within its span.²⁰ Aristoxenus recognised, nevertheless, that certain specific locations for these moveable notes were more familiar than others, and that the forms of tetrachord produced when they were in these positions deserved the theorist's special attention.²¹ He recognised two such principal forms of the diatonic. In the commoner of them, the 'tense' diatonic, the intervals within the tetrachord, from the bottom upwards (measured in tones), are $\frac{1}{2}$, 1, 1. In the 'soft' diatonic they are $\frac{1}{2}$, $\frac{3}{4}$, $1\frac{1}{4}$ (*El. Harm.* 51.22–31). In the tense diatonic (the version that Nicomachus had in mind) the pitches of *paranētē synēmmenōn* and *tritē diezeugmenōn* coincide, the former being separated from *mesē* by the first two steps of its tetrachord, $\frac{1}{2}$, 1, the latter by the tone of disjunction and the first step of the tetrachord *diezeugmenōn*, 1, $\frac{1}{2}$. In the soft diatonic they do not. *Tritē diezeugmenōn* is still a tone and a half above *mesē*, but *paranētē synēmmenōn* has moved downwards through a quarter-tone. Nevertheless the author of our passage, on my reading of it, is right. If we consider the whole range of the note *tritē diezeugmenōn*, regardless of genus, we find that it covers exactly the span of a quarter-tone.²² It is at the top of its range in diatonic, at the bottom in enharmonic, where it lies a quarter-tone above *paramesē*, $1\frac{1}{4}$ tones above *mesē*. Diatonic *paranētē synēmmenōn*, according to the Aristoxenian analysis, occupies exactly the same range, since there can be no *paranētē* higher in the tetrachord than that of the tense diatonic, and no *paranētē* lower than that of the soft diatonic will count as diatonic.²³ The number of subtly distinct

¹⁹ I should emphasize that the theoretical apparatus required is specifically Aristoxenian, not shared by theorists in general. Though many of the conceptions involved are indeed common to writers of all schools, the quantifications given below, on which the detailed interpretation of the passage depends, are specific to Aristoxenus and his followers.

²⁰ See especially the long discussion at *El. Harm.* 22.24–27.14.

²¹ These divisions of the tetrachord are *ἐξάιρετοί τε καὶ γνώριμοι*, *El. Harm.* 50.19–22.

²² It is identical with the range of *parhypatē*, the corresponding note in the tetrachord *mesōn*: this is specified at *El. Harm.* 23.25–6.

²³ Diatonic tetrachords include all those in which the two lowest intervals are jointly equal to or greater than the highest interval. Where this is not the case the pair of intervals at the

diatonic *paranētai synēmmenōn* there can be, and the number of distinct *tritai diezeugmenōn*, is potentially infinite,²⁴ since their trajectory through their range is continuous (*συνεχής*); but wherever there can be a note in the one category there can be a note in the other. The pitch of a diatonic *paranētē synēmmenōn* is always available for a *tritē diezeugmenōn*, and conversely. The fit between Aristoxenian theory and the rather esoteric statement we have reconstructed is exact, and the complexities involved must substantially reduce the chances that the match is a mere coincidence. It seems legitimate to claim that the reconstruction is not just possible, but probable.

Finally we meet the reference in line 13 to the enharmonic and (probably) the chromatic genus. I have already discussed this briefly: the core of my conjecture is that the author is contrasting their case with that of the diatonic. I would therefore guess at something of the following sort for lines 12–14: *ἐν δὲ τῷ / χρωματικῷ καὶ ἐναρμονίῳ / οὐκ ἔστιν οὕτως, ἀλλὰ δεῖ...* If this is roughly right, the point is readily understood, since the proposition stated above, that *paranētē synēmmenōn* and *tritē diezeugmenōn* inhabit the same range, is not true when the *paranētē* is chromatic or enharmonic.²⁵ Presumably the author went on to explain by what devices a comparable ‘mixture’ or ‘modulation’ might be achieved in these cases, and it is a great pity that his account has been lost.

Let us now take stock, and ask whether the passage, as I have interpreted it, has any independent significance for our understanding of Greek harmonics or adds up to no more than repetitions of familiar doctrine. Haslam, in his prefatory remarks, comments that the work ‘was no elementary one’, and he is evidently right: it involves complications of a distinctly rarified sort. I want to suggest that there are two respects in which it points to developments of Aristoxenian thought beyond anything found in existing treatises, even though it provides us with no new ‘facts’ about Greek harmonic structures. The first point is simple. Though several authors, as I have said, regard the shift between conjunct and disjunct systems as an important and musically very acceptable form of modulation, none of them indicates a contrast between the ways it can be handled in diatonic and in the other two genera. They allude only to features that such modulations share in all genera: they involve a modulation or transposition through the interval of a tone, or, in the analysis of Ptolemy, they amount to modulation to a *tonos* at the interval of a fourth from the original.²⁶ Only the present author seems to focus on the fact that in diatonic, and there alone, the modulation can always be made to pivot on a single pitch, whose character or melodic function is transformed in the passage of the melody from one system to the other. If we identify *mesē* with the modern note A, for example, and consider the brief melodic sequence ABCB^bA, the first two notes are *mesē* and *paramesē* (the lowest note of the tetrachord *diezeugmenōn*), and the last two are *tritē synēmmenōn* and *mesē*, where *mesē* is now treated as the lowest note of the tetrachord *synēmmenōn*. A transition between tetrachords has taken place, pivoting on the note C, which in its

bottom constitutes what is called a *πυκνόν*, which is characteristic of chromatic and enharmonic divisions. See e.g. *El. Harm.* 24.11–14, 25.6–9: the distinction is consistently maintained in Aristoxenus and all subsequent theorists.

²⁴ Compare what is said of the note *lichanos* at *El. Harm.* 26.13–18.

²⁵ The interval from *mesē* to *tritē diezeugmenōn* varies between $1\frac{1}{2}$ and $1\frac{1}{4}$ tones, as we have seen. *Paranētē synēmmenōn*, however, can be a mere $\frac{1}{2}$ tone above *mesē* in enharmonic and $\frac{3}{4}$ tone in chromatic. Even the highest chromatic version of the note must inevitably be less than $1\frac{1}{4}$ tones above *mesē*, since at that point the highest interval in the tetrachord becomes equal to the combination of the two lower intervals, and the division must be diatonic (see n. 23 above).

²⁶ For both aspects of the matter see *Ptol. Harm.* II.6: cf. Cleonides, *Eisagoge* 205.5–206.2.

initial context must be *tritē diezeugmenōn* (the ‘higher’ *tritē*), but in retrospect, in the light of the subsequent *B^b*, functions also as *paranētē synēmmenōn*. Here we have an instance in which modulation takes place within a single note, rather than in the transition between one note and the next: the note is complex or ambiguous in its melodic function. In chromatic and enharmonic the composer cannot draw on the strategy of ‘ambiguating’ a corresponding note in this way.

This brings me to my second and last reflection on the passage’s general significance. Most authors who discuss modulation between sequences in these two tetrachords do so in a severely theoretical context. In Ptolemy the discussion is embedded in a dispute about the putative independence of two allegedly ‘complete’ theoretical systems. In Cleonides and Bacchius it appears only in a summary list of types of modulation. The exception is Aristides Quintilianus: in his treatment (29.12–14) the reference occurs in a brief discussion of melodic composition (*μελοποιία*), which emphasizes the role of this kind of transition in the practical procedures of composers. He adds, however, as a kind of parenthesis, that this same phenomenon *κάν ταῖς μεταβολαῖς θεωρεῖται*, meaning that remarks about it are also found among purely abstract treatments of modulation. The unusual feature of the Oxyrhynchus author’s approach is that it seems to offer a fusion of the two strategies gestured at by Aristides. While introducing the subject in the ‘practical’ context of *μελοποιία* it nevertheless handles it in a closely technical manner, with recourse to quite specialised levels of theoretical doctrine. This suggests a much closer and technically harder-edged attempt at the analysis of compositional manoeuvres than is found in any of the surviving treatises.

We know that *μελοποιία* was included by Aristoxenus, in the second version of his treatise on harmonics, as the final topic with which the science should concern itself.²⁷ But his discussion of the subject is lost, and the treatments offered by later writers in the Aristoxenian tradition are cursory and only fitfully illuminating. The Oxyrhynchus fragment at least does something to encourage the belief that fuller investigations were sometimes attempted; and in view of the close correspondence between its statements and the minutiae of Aristoxenian doctrine that we have noted, there is no doubt that it belongs squarely in that tradition, whether the words are those of Aristoxenus himself or of a later disciple. The hypothesis that it occupied itself, at least in passing, with the shapes of actual melodies, is suggested by the fairly certain occurrence of the expression *μεικτὴ μελοποιία*, and there may possibly be a hint of recommendations about compositional strategy, given the context, in the broken phrase *ἀλλὰ δεῖ...* at the end of the part we have been studying. A genuine focus on heard melodies, not just on the unheard phantasms of theory, might also do something to explain the traces in line 3 of the letters *ελελιζο*. If these are rightly read, they can hardly represent anything but part of the verb *ἐλελίζειν*, which is unknown in the context of harmonic theory. Conceivably it came from a quotation from a poet-musician of the past. One is unavoidably reminded of the evocation of the ‘golden phorminx’ in Pindar’s first *Pythian*, *ἀγῆσιχόρων ὁπότεν προοιμίων / ἀμβολὰς τεύχης ἐλελιζομένα* (*Pyth.* 1.4), but this may be misleading: perhaps the verb here is not LSJ’s *ἐλελίζω* (A), to whirl or set vibrating, but *ἐλελίζω* (B), used in the middle voice by Euripides and Aristophanes to designate the trilling of the nightingale (*Helen* 1111, *Birds* 213). At any rate, given the sequel, it seems likely to have served as a vivid description of the ‘whirlings’ or ‘warblings’ of a melody that runs up and down through a modulating pattern, transforming itself at every turn. So colourful an

²⁷ See *El. Harm.* 38.17–18 with 34.34. Many later authors include *μελοποιία* in their lists of the ‘parts’ of harmonics. But contrast *El. Harm.* 1.22–2.7.

evocation points to the author's record of a sensitive aesthetic response to the contours of an actual melody or melodies, where the grounds for this response are elucidated through the technical analysis to which the melodic forms are subsequently subjected. It has often been suggested that Greek harmonic theory in general had little connection with the facts of contemporary musical experience, and no doubt the present fragment is too small and its interpretation too uncertain to prove the contrary. But if my reading is anywhere near the mark there was at least one Aristoxenian, whether Aristoxenus himself or an intelligent and imaginative disciple, for whom harmonic theory could give insights into the workings of real music, and was not merely a dusty concatenation of abstract propositions.

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